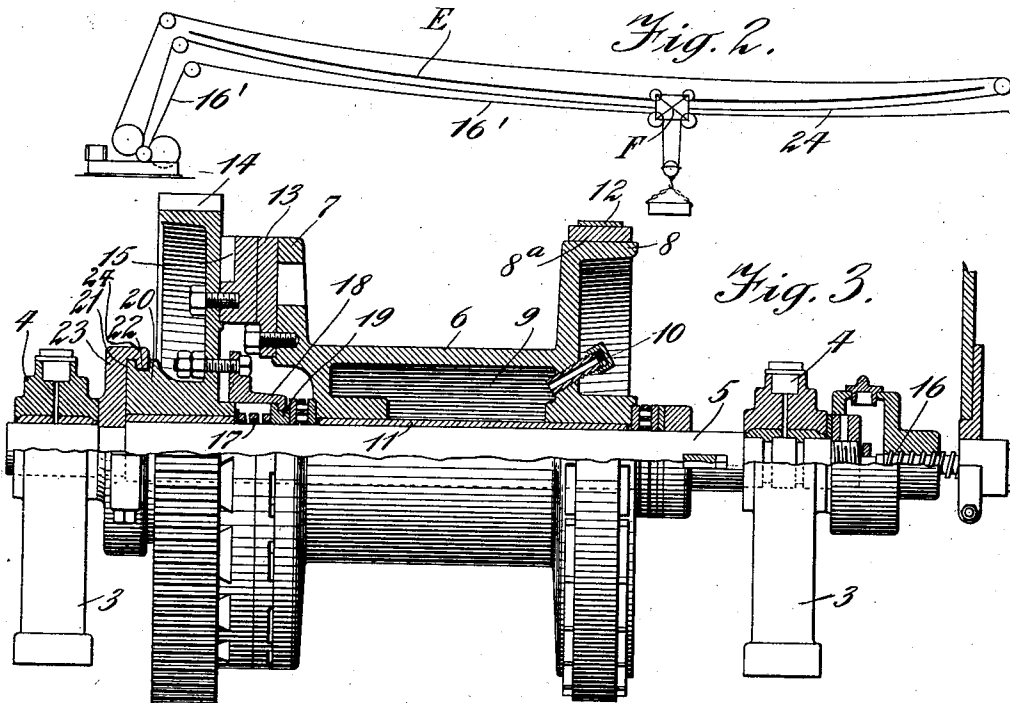
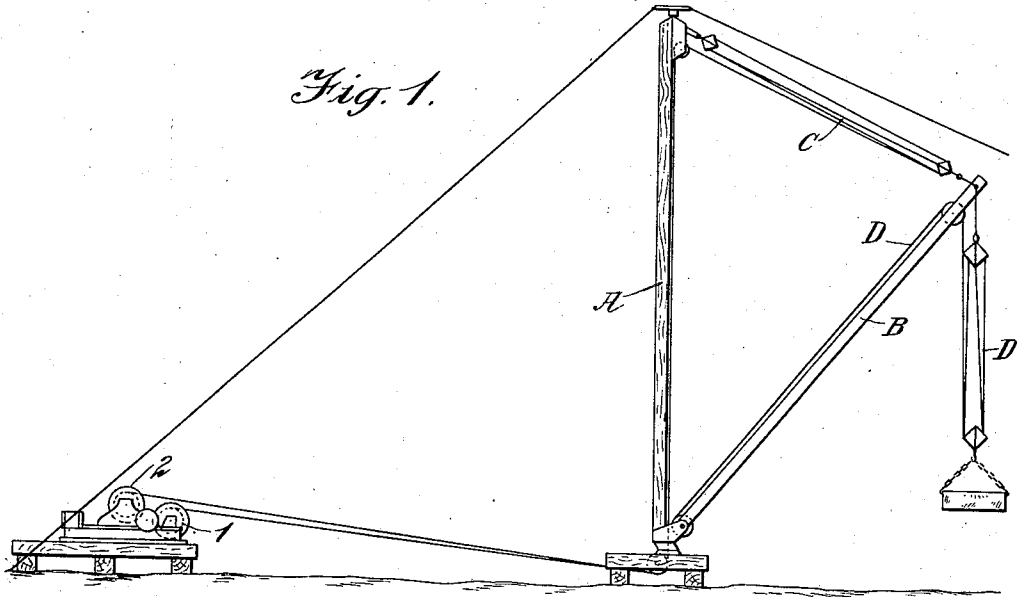


T. S. MILLER.
HOISTING ENGINE.
APPLICATION FILED OCT. 27, 1909.

1,024,520.

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WITNESSES:

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THOMAS SPENCER MILLER, OF SOUTH ORANGE, NEW JERSEY.

HOISTING-ENGINE.

1,024,520.

Specification of Letters Patent.

Patented Apr. 30, 1912.

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To all whom it may concern:

Be it known that I, THOMAS SPENCER MILLER, a citizen of the United States, residing at South Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Hoisting-Engines, of which the following is a specification.

My invention has relation to new and useful improvements in hoisting engines, and more particularly to a novel construction of a friction drum for use in connection therewith.

The invention appertains especially to that type of hoisting engine almost universally employed, in which a shaft is provided upon which the drum is loosely mounted to turn freely thereon, said shaft having also mounted thereon a driving element, means being provided for placing the drum in and out of position to be driven by the gear, and a brake for holding the drum against paying out when starting a load and disconnected from driving connection with the driving gear.

Generally speaking, there are two accepted types of engines in use which have peculiar advantages, one being constructed with a drum loosely mounted on a shaft to be moved longitudinally thereof to be clutched to a gear fixed to the shaft; and the other in which the drum is movable longitudinally to engage the gear to be clutched thereto, but in which the drum is keyed to the shaft and the gear is mounted to turn independently of the shaft. Both of these types have proven more or less efficient. The feature of having the drum loosely mounted on the shaft in one type having its recognized advantages, and the construction involving the loosely mounted gear being also desirable, many attempts have been made to combine both of these features and their attendant advantages in one structure, but no construction of which I am aware has accomplished this desideratum prior to my present invention.

In the first type the loose drum is particularly desirable because of the ease of control, and efficiency in letting down a light load as the load can overhaul the drum when being opposed by the shaft and its bearings or parts geared thereto. In the second type the freely running gear is advantageous as the engine may be permit-

ted to run without turning the shaft while the drum is being held to support a load temporarily, and there is no danger of the bushing of the drum being worn unevenly during such operation in such a manner as to permit lubricant to leak out of the drum. Another advantage in this last construction is the small degree of frictional resistance given to the drum shaft when the gear is uncoupled from the drum and is free to run, particularly in engines where there is a large number of drum shafts and gears, in this construction the latter causing practically no drag on the shaft which is running loose when the gear is free. Other advantages of both types which are well-known to those skilled in the art need not be set forth here.

In one type of construction in which an attempt was made to combine the advantages of both of the above types in a single machine the shaft is non-revoluble and both drum and gear are mounted to revolve freely thereupon. This has proved objectionable for the reason that the shaft will be worn unevenly and its proper circular contour destroyed, due to the fact that the strongest or highest degree of friction between the same and the drum would always be at one side; namely, on that side opposite to that from which the pull on the cable is exerted.

The object of my invention is, therefore, to obtain all the advantages of a loosely mounted drum, and a loosely mounted driving member in a single structure and avoid the disadvantage of a stationary supporting shaft, and to provide a friction drum construction in which the uneven wearing of the shaft will be obviated.

The invention consists in the improved construction to be fully described hereinafter, and the novelty of which will be particularly pointed out and distinctly claimed.

I have fully and clearly illustrated my invention in the accompanying drawings to be taken as a part of this specification and wherein:—

Figure 1 is a view in side elevation of a boom derrick hoisting apparatus in connection with which my invention is particularly adapted for use. Fig. 2 is a diagrammatic view of a cableway system to which the invention is applicable, and Fig. 3 is a view in elevation and partly in section of

the drum engine embodying my present invention.

In order that the function and purposes of the invention may be better understood, I have deemed it best to describe it in connection with some apparatus or system to which it is applicable, and will first describe it in connection with a fall boom derrick.

Referring to Fig. 1 by characters of reference:—A designates the mast of a derrick, B the boom, C the rope system for raising and lowering the boom operated by a drum 1, and D the hoisting rope for raising and lowering the load, said hoisting rope being operated to accomplish its intended purposes from a drum 2. All of the derrick construction just briefly described is well known in the art and it is thought will be understood without more elaborate description. Before proceeding further I would state that the position of the boom in the derrick of the character described is seldom altered, it perhaps not being raised or lowered during a period of more than five or ten per cent. of the time the derrick is being operated, and it will thus be seen that the drum 1 serves practically the entire time, as a holding drum and that it is at all times, together with its shaft, subjected to heavy strains, owing to the weight of the boom and the load. Under such conditions it is desirable that the parts subject to strain remain in repose with relation to each other.

My present invention is particularly applicable as a holding drum for raising and lowering the boom as it corrects to a great extent the objections just noted. That is to say, the shaft and drum both remain stationary.

Referring to Fig. 3 of the drawings, 3, 3 indicate standards provided with bearings 4, 4 in which is mounted for free rotation a drum shaft 5. Mounted upon the shaft 5 to turn freely in either direction therein is a rope drum 6 having the usual flanges 7, 8. The drum is preferably hollow to provide a chamber for lubricant, as at 9, fed through an inlet 10, and interposed between the shaft and drum is a bronze bushing 11, this arrangement providing for the most effective lubrication of the drum and shaft so as to obviate friction between the same as far as possible.

The flange 8 of the drum is provided with a braking face 8^a with which coöperates a band brake 12 of any well-known type, the same operating to retard the movement of the drum in paying out the rope or to hold the same against rotation. The opposite head or flange of the drum has bolted thereto one element 13 of a friction clutch the purpose of which will be fully set forth presently. Also mounted upon the shaft 5 to turn freely thereon, and also to have movement longitudinally thereof, is a driv-

ing element 14 in the form of a spur gear adapted to be driven from any suitable source of power, said gear having a suitable friction clutch element or face 15 to coöperate with that on the drum 6.

The drum 6 is arranged to be moved longitudinally of the shaft in order to place the friction clutch elements in contact and for this purpose the usual end thrust mechanism illustrated generally at sixteen is provided, said mechanism serving to move the drum in one direction, a spring 17 coiled about the shaft and located between the driving element and the drum operating to separate the friction elements when the thrust is relieved. This spring is preferably housed within a bushing 18 bolted to the driving element and is separated from the drum by a collar 19 on the shaft, suitable anti-friction bearings being arranged between the collar and the drums.

The hub 20 of the driving element on the side opposite to that next to the drum is shown of a diameter greater than usual to provide sufficient frictional area or face 21, and said hub is formed with an annular groove 22, as shown. Upon the shaft 5 located between the bearing 4 and the hub of the driving element, and fixed to the shaft to revolve in unison therewith, is a friction disk 23 having an overhanging flange 24 projecting within the groove 22 in the hub 20, said friction disk being arranged with its face in contact with the face 21 of the hub 20. This disk 23 also acts as a collar to control the endwise play of the gear. It is preferably made in sections or halves and bolted together fitting into a recess in the shaft.

The proportions of the hub and disk are immaterial as long as the parts are so proportioned that sufficient friction will be generated between the same to insure the rotation of the shaft. It is obvious that the size of these elements should not be so large as to cause a drag upon the gear when it is running free, nor should they be so small as not to generate sufficient friction to provide a satisfactory connection between the gear and the shaft.

The parts being as just described, the operation thereof and the advantages accruing therefrom are in part as follows: As heretofore stated, this engine may be employed as a means for raising and lowering the boom of the derrick and for holding the same in the position to which it may be adjusted. When it is desired to raise the boom, the thrust mechanism is operated to shift the drum lengthwise of its shaft and place its friction element 13 in engagement with the friction element 15 on the driving element and the latter, being operated from a source of power, will cause the drum to be revolved to take up the rope. The boom being ele-

vated to the desired position, the engine can then be stopped and the drum will be held to maintain the boom in adjusted position. If it is desired to lower the boom the thrust mechanism is operated to separate the friction elements 13, 15, and the weight of the boom overhauls the drum, the brake 12 being employed to retard the revolution of the drum. The brake may be employed for holding the boom in elevated position, at which time the drum is disconnected from the driving element. The above applies to the general operation of the engine, and I will now set forth the operation of that part of the construction pertaining to the friction hub and friction collar in the shaft 5. It is clear that in order to raise the boom the gear and drum must revolve, and this is accomplished by placing their frictions in contact through the medium of the thrust mechanism utilized to shift the drum. At the same time as the drum is shifted to connect it with the driving element the latter will in turn be given a slight movement longitudinally of the shaft and will force its friction hub into frictional engagement with the friction disk on the shaft. In view of the fact that the hub and disk friction is of greater radius than the radius of the shaft itself, a higher friction will be produced and the shaft will be forced to revolve. While the load is being hoisted there is, of course, pressure between the drum and shaft which causes friction between the same about equal to the friction in the shaft bearings but not enough to insure the turning of the shaft. The addition of the friction surfaces 21, 23, therefore, insures the turning of the shaft whenever the load is lifted, so that an uneven wearing of the shaft as heretofore set forth as present where the shaft is held against rotation is effectually prevented.

My invention as applied to a cableway is illustrated in Fig. 2. In this instance the engine is provided with a moving drum 1 and a load drum 2, as above described, the drum 1 operating the endless or conveyer rope 24 while the drum 2, which is of the usual construction, operates the hoisting line 16'. The main cable is indicated at E and the load carriage at F. The operation of the cableway is well known, the load carriage F being moved to any position along the span by the operation of the moving drum 1, and held in such position by braking the drum 1 during the hoisting or lowering of the load.

While I have stated generally two applications to which the invention may be put, I wish it distinctly understood that the invention is not to be limited to any particular use, as it is intended for use wherever the peculiar advantages of the construction may be desirable.

While I have shown a very satisfactory means for revolving the drum and gear supporting shaft, I do not desire to be limited to the particular and specific construction shown as my invention is intended to be broad enough to cover any means for imparting a rotation to the shaft so as to change the position thereof relative to the gear and drum so that no one portion of said shaft is for any considerable time subjected to a continuous wear.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a hoisting apparatus, a shaft free to revolve, a driving element and a drum mounted on the shaft for free revolution independently thereof and of each other, said driving element and drum being slidable lengthwise of the shaft, means for connecting and disconnecting said driving element and drum by movement of one of the same longitudinally of the shaft, and means independent of said first named means for coupling one of said elements to the shaft when said elements are connected to cause said elements and shaft to revolve together.

2. In a hoisting apparatus, a freely rotatable shaft, a driving element and a drum mounted on the shaft for free revolution independent thereof and of each other, and for movement longitudinally of the shaft, said driving member being adapted to be driven independently of the shaft, means for coupling the drum and driving member adapted to be set and unset by movement of one of said elements longitudinally of the shaft, means other than said first named means for connecting one of said members to, and disconnecting it from, the shaft, and means whereby said second named means is set by the clutching of said members to each other and is unset when said members are unclutched.

3. In a hoisting apparatus, a shaft free to revolve, a driving element mounted thereon to revolve independently thereof, a drum on the shaft free to revolve independently of the shaft and of the driving element and movable longitudinally of the same, friction means for connecting the driving element with the shaft to cause the driving element to turn the shaft, friction means other than said first named means for connecting the driving element and the drum, and means for simultaneously placing both of said friction means in operative condition to connect the driving element with the shaft and drum, respectively by movement of the drum longitudinally of the shaft.

4. In a hoisting apparatus, a shaft free to revolve, a driving member and a drum mounted on the shaft for revolution independently thereof, and for movement longitudinally of the shaft, clutch members on

the adjacent faces of said member and drum for connecting same by movement of one of the same longitudinally of the shaft, a clutch element fixed to the shaft on the opposite side of the driving element from the drum, and means for moving the driving member and drum longitudinally of the shaft to couple the same and engage the driving member with said clutch element.

5. In a hoisting apparatus, a shaft free to revolve, a driving gear and a drum mounted on the shaft for revolution independently thereof, and for movement longitudinally of the shaft, said gear being adapted to be driven independently of the shaft, co-acting clutch surfaces on the adjacent faces of said gear and drum for connecting the same by movement of one of the same longitudinally of the shaft, a clutch element fixed to the shaft on the opposite side of the driving gear from the drum, and means for moving the driving gear and drum longitudinally of the shaft to couple the same and engage the driving gear with said clutch element.

6. In a hoisting apparatus, a shaft free to revolve, a driving element mounted thereon free to revolve independently thereof, and movable lengthwise of the shaft, a drum mounted on the shaft to one side of the driving element and movable longitudinally of the shaft, a friction element carried by the opposite side of the said driving element, a friction element fixed to the shaft to cooperate with the second mentioned friction element on the driving element, friction means for connecting the driving element and drum, the arrangement being such that a longitudinal movement of the drum on the shaft will serve to connect the drum to the driving element and move the latter to connect it to the shaft.

7. In a hoisting apparatus, a shaft free to revolve, a driving member and a drum mounted on the shaft and capable of free revolution independently of the shaft, one of said members being movable longitudinally of the shaft toward and away from the other member, clutch means set and unset by movement of one of said members toward and away from the other, a clutch means operating on one side of one of said members opposite from the other member to clutch the adjacent member to the shaft, and means whereby the movement of one of said members longitudinally to the shaft clutches said members to each other and operates

said second clutch means to connect the member adjacent thereto to the shaft.

8. In a hoisting apparatus, a shaft free to revolve, a driving member and a drum mounted on the shaft for revolution independently thereof and for movement longitudinally of the shaft, coacting friction surfaces on the adjacent faces of said member and drum for connecting the same by a movement of one of the same longitudinally of the shaft, a friction element fixed to the shaft on the opposite side of the driving element from the drum and means for moving the driving member and drum longitudinally of the shaft to couple the same and engage the driving member with said friction element.

9. In a hoisting apparatus, a shaft free to revolve, a driving member and a drum mounted on the shaft for free revolution independently thereof, and one of the same being slidable longitudinally thereof, coacting friction clutch faces on the adjacent faces of said member and drum, means for engaging and disengaging said faces by a movement of one of the same longitudinally of the shaft, an element fixed to the shaft, and means whereby one of said revolvable elements is coupled to said fixed element upon the coupling of said revolvable elements to each other.

10. In a hoisting apparatus, a shaft free to revolve, a driving element mounted on the shaft for sliding movement longitudinally thereof and to revolve independently thereof, a drum revolvable on the shaft and movable longitudinally thereof, coacting friction surfaces on the adjacent faces of the driving element and drum for connecting the same by a sliding movement of one of said members longitudinally of the shaft, thrust means independent of the clutch surfaces and said friction element for moving one of said members longitudinally of the shaft toward and away from the other of said members, and a friction element fixed to the shaft adjacent one of said members to be engaged by said member when the latter is moved longitudinally of the shaft in the act of coupling said members.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS SPENCER MILLER.

Witnesses:

ERNEST PULEFORD,
C. G. HEYLMUR.